REMARKS

In view of the above amendments and the following discussion, the Applicants submit that none of the claims now pending in the application is anticipated or obvious under the provisions of 35 U.S.C. § 102 and § 103. Thus, the Applicants believe that all of these claims are now in allowable form.

I. IN THE SPECIFICATION

The Abstract has been amended in accordance with the Examiner's comments. Namely, phraseology such as "means" and "said" have been removed. The Applicants respectfully submit that the Abstract now fully complies with MPEP §608.01(b).

I. REJECTION OF CLAIMS 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 30 AND 31 UNDER 35 U.S.C. § 102

The Examiner has rejected claims 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 30 and 31 in the Office Action under 35 U.S.C. § 102 as being anticipated by Kartalopoulos (US Patent 6,580,538, issued June 17, 2003, herein referred to as "Kartalopoulos"). The Applicants respectfully traverse the rejection.

Kartalopoulos teaches reduction of optical impairments in wavelength division multiplexed systems employing a wavelength bus architecture. Kartalopoulos employs a scheme to reduce bit patterns, such as "all ones", that give rise to four wave mixing or other nonlinear effects. (See Kartalopoulos, Col. 3, Lines 39-46.) More specifically, Kartalopoulos tries to transform "all ones" bit patterns into a bit pattern that does not have "all ones". (See Kartalopoulos, Col. 6, Lines 30-39.)

The Examiner's attention is directed to the fact that Kartalopoulos fails to teach a method for increasing transmission distance using tedons with an encoding scheme that reduces a number of ones disproportionally relative to a number of zeros, as positively claimed in Applicants' independent claims. Specifically, Applicants' claim 1 shown below is representative of Applicants' independent claims:

> 1. A method for increasing transmission distance of a fiber optical communications link using tedons comprising the steps of:

encoding a data signal to be transmitted using an encoding scheme that reduces a number of ones disproportionally relative to a number of zeros in said data signal; and

transmitting said encoded data signal over said fiber optical communications link using said tedons. (Emphasis Added.)

Applicants teach a system and method for increasing transmission distance and/or transmission data rates using tedons and an encoding scheme that reduces the number of ones in a data signal. Long-haul transmission of information with optical fibers and in-line optical amplifiers, using digital on/off transmission format, suffers from two main impairments. One is the presence of the amplified spontaneous emission (ASE) noise of the amplifiers. The second impairment is the signal distortion caused by optical nonlinearity, chiefly the Kerr effect. Unfortunately, solutions that address one of these impairments often significantly exacerbate the other impairment.

In a binary channel, Applicants have disclosed a method that can increase transmission distance and/or rate while substantially addressing both impairments. Applicants' invention teaches a method for increasing transmission distance using tedons and an encoding scheme that reduces a number of ones disproportionally relative to a number of zeros, e.g., keeping probability of one to 25% and of zero to 75%. In other words, in a binary system where two symbols are equally probable, the present invention intentionally reduces a number of ones (a first symbol) disproportionally relative to a number of zeros (a second symbol). Furthermore, Applicants teach the use of tedons (short pulses with low duty-cycle) in conjunction with the encoding scheme. This novel combined approach is completely absent in the Kartalopoulos reference.

It should be noted that although Applicants amended the independent claims to clearly recite "using said tedons" in the body of the claims, it is Applicants' position that this limitation was present in the originally filed claims. Applicants simply amended the independent claims to ensure clarity of this limitation to the Examiner.

In contrast, Kartalopoulos only teaches transforming "all ones" bit patterns into a bit pattern that does not have "all ones." (See Kartalopoulos, Col. 6, Lines 30-39.) The Applicants respectfully submit that the Examiner has interpreted Kartalopoulos too broadly. Transforming "all ones" bit patterns into a bit pattern that does not have "all

ones" is not necessarily reducing a number of ones disproportionally relative to a number of zeros. Furthermore, Kartalopoulos is completely devoid of any teaching or suggestion in the use of tedons in conjunction with the encoding scheme. Thus, Kartalopoulos fails to anticipate Applicants' independent claims 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 30 and 31. As such the Applicants respectfully request the rejection be withdrawn.

II. REJECTION OF CLAIMS 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26 AND 28 UNDER 35 U.S.C. § 103

The Examiner has rejected claims 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26 and 28 in the Office Action under 35 U.S.C. § 103 as being unpatentable over Kartalopoulos in view of Fukui (US 6,442,200, issued August 27, 2002, herein referred to as "Fukui."). Applicants respectfully traverse the rejection.

The teachings of Kartalopoulos are discussed above. Fukui teaches a modulating circuit, demodulating circuit and modulating and demodulating circuit system using PPM method.

The Examiner's attention is directed to the fact that Kartalopoulos fails to teach a method for increasing transmission distance using tedons with an encoding scheme that reduces a number of ones disproportionally relative to a number of zeros, as positively claimed in Applicants' independent claims. (See Applicants' independent claim 1, *supra*.)

Applicants teach a system and method for increasing transmission distance and/or transmission data rates using tedons and an encoding scheme that reduces the number of ones in a data signal. Long-haul transmission of information with optical fibers and in-line optical amplifiers, using digital on/off transmission format, suffers from two main impairments. One is the presence of the amplified spontaneous emission (ASE) noise of the amplifiers. The second impairment is the signal distortion caused by optical nonlinearity, chiefly the Kerr effect. Unfortunately, solutions that address one of these impairments often significantly exacerbate the other impairment.

In a binary channel, Applicants have disclosed a method that can increase transmission distance and/or rate while substantially addressing both impairments.

Applicants' invention teaches a method for increasing transmission distance using tedons with an encoding scheme that reduces a number of ones disproportionally relative to a number of zeros, e.g., keeping probability of one to 25% and of zero to 75%. In other words, in a binary system where two symbols are equally probable, the present invention intentionally reduces a number of ones (a first symbol) disproportionally relative to a number of zeros (a second symbol). Furthermore, Applicants teach the use of tedons (short pulses with low duty-cycle) in conjunction with the encoding scheme. This novel combined approach is completely absent in the Kartalopoulos reference.

In contrast, the alleged combination (as taught by Kartalopoulos) only teaches transforming "all ones" bit patterns into a bit pattern that does not have "all ones." (See Kartalopoulos, Col. 6, Lines 30-39.) Transforming "all ones" bit patterns into a bit pattern that does not have "all ones" is not necessarily reducing a number of ones disproportionally relative to a number of zeros. As such, Kartalopoulos simply does not teach a method for increasing transmission distance using tedons with an encoding scheme that reduces a number of ones disproportionally relative to a number of zeros. However, the Examiner alleges that Fukui bridges the significant gap left by Kartalopoulos. The Applicants respectfully disagree and submit that the Examiner has interpreted Fukui too broadly.

Fukui fails to teach, show or suggest the novel method for increasing transmission distance using tedons with an encoding scheme that reduces a number of ones disproportionally relative to a number of zeros. Fukui only teaches an encoding scheme in pulse position modulation.

In arguendo, even if Kartalopoulos and Fukui were combined, the combination would still not teach or suggest Applicants' invention. The combination of Kartalopoulos and Fukui would only teach a PPM encoding scheme for changing bit patterns of "all ones" into bit patterns that are not "all ones" without any teaching or suggestion in the use of tedons as positively claimed by the Applicants.

Therefore, Applicants respectfully submit that independent claims 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 30 and 31 are clearly patentable over Kartalopoulos and Fukui. Furthermore, dependent claims 2, 4, 6, 8, 10, 12, 14, 16, 18,

20, 22, 24, 26 and 28 depend from claims 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, and 27 and recite additional limitations. As such, and for the exact same reason set forth above, the Applicants submit that claims 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26 and 28 depend are also patentable over Kartalopoulos and Fukui.

Conclusion

Thus, the Applicants submit that all of these claims now fully satisfy the requirements of 35 U.S.C. §102 and § 103. Consequently, the Applicants believe that all these claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

If, however, the Examiner believes that there are any unresolved issues requiring the maintenance of the present final action in any of the claims now pending in the application, it is requested that the Examiner telephone Mr. Kin-Wah Tong, Esq. at (732) 530-9404 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

4/4/05

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